

1 1. A template comprising:
2 a plurality of adjacent parallel pins forming an array,
3 a pin sleeve for engaging and slideably holding the pins in the array,
4 the pin sleeve having a locking mechanism to fix the pins in their relative
5 positions when desired,
6 a flexible track attached to a first end of the pins for forming a closed loop
7 template, the track having a first fixed end and a second free end, the first fixed end being
8 tapered to create a smooth joint as it forms the closed loop with the second free end, so as
9 to allow for the adjustability of the length of the track, as the pins are moved relative to
10 each other.

1 2. A template as in claim 1 wherein,
2 the plurality of pins are cylindrically arrayed.
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1 3. A template as in claim 2 wherein,
2 the pin sleeve has a guide for attaching a tool to move along the pin sleeve.
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1 4. A template as in claim 2 wherein,
2 the template is attached to a cylinder,
3 a tool rotatably attached to the cylinder, the tool having an arm for engaging the
4 track on the template such that the tool can follow the track on the template as it rotates
5 on the cylinder.
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1 5. A template as in claim 4 wherein,
2 the arm is magnetically attracted to contact the track on the template.
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1 6. A template as in claim 5 wherein,
2 the arm has a spring for urging the arm contact with the track on the template.
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7. A template as in claim 1 wherein,
the pin sleeve comprises connectable segments with each segment is connected to
other segments for adjusting the pin sleeve length.

8. A template as in claim 1 wherein,
the pin sleeve has an engagement mechanism to attach it to an object.

9. A template as in claim 1 wherein,
the pin sleeve is flexible so it can be shaped to an object.

10. A template as in claim 2 wherein,
the sleeve is in the form of a tubular pantograph mechanism, allowing the pin
sleeve to have an adjustable diameter to fit different pipe sizes.

11. A template as in claim 2 wherein,
a self centering mechanism centers the template on a cylindrical object to which it
is attached.

12. A template as in claim 1 wherein,
the track has a magnetic material for attracting and engaging an arm on a tool for
guiding the tool.

13. A template as in claim 1 wherein,
the track has a wire for creating an electromagnetic field for attracting and
engaging an arm on a tool for guiding the tool.

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1 14. A template comprising:
2 a plurality of adjacent parallel pins forming an array,
3 a pin sleeve for engaging and slideably holding the pins in the array,
4 the pin sleeve having a locking mechanism to fix the pins in their relative
5 positions when desired,
6 a flexible track attached to a first end of the pins for forming a template as the
7 pins are moved relative to each other,
8 the pin sleeve has a guide for attaching a tool to move along the pin sleeve.

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1 15. A template as in claim 14 having,
2 a means for fixing the template in place on a workpiece.

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3 16. A method of forming templates for tools to use comprising:
4 holding a plurality of pins in a pin sleeve which fixes the pins in a radial position
5 around a center line such that the pins form a cylinder,
6 attaching a smooth faced adjustable length flexible track to one end of the
7 plurality of pins,
8 forming a template of the smooth faced flexible track by adjusting the length of
9 each pin relative to the adjacent pins longitudinally along the axis of the cylinder while
10 adjusting the length of the adjustable flexible track, and
11 locking the pins in position relative to the pin sleeve such that the template
12 remains fixed,
13 forming a track on the pin sleeve for guiding a tool..

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1 17. A method of forming templates for tools as in claim 16 further comprising the
2 step of:
3 attaching a work tool having an arm for following the template to the pin sleeve,
4 such that the tool can work on a workpiece by following the template.

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1 18. A method of forming templates for tools as in claim 16 further comprising the
2 step of:
3 holding a plurality of pins in a pin sleeve which fixes the pins in a radial position
4 around a center line such that the pins form a cylinder,
5 forming a template of the pins by placing the pins around a component, of a pipe
6 to pipe assembly to be welded, and allowing the pins to register the shape of the seamline
7 to be welded;
8 locking the pins in position relative to the pin sleeve such that the pins remains
9 fixed in position,
10 sliding the template back from the seamline of the connection, and locking it in
11 position,
12 attaching a smooth faced adjustable length flexible track to one end of the
13 plurality of pins,
14 attaching a welder having a tracing arm to a guide built into the template,
15 using the track on the template to guide the tracing arm to weld the seamline of
16 the connecting pipes.

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1 19 A method of forming templates for tools as in claim 16 further comprising the
2 step of:
3 attaching a work tool, having an adjustable length arm mechanism and a motion
4 system, to a workpiece, such that the tool can work on the work piece by allowing the
5 adjustable arm mechanism to follow the template while the motion system allows the
6 work tool to maintain its relative orientation and distance to the surface work piece.

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20. A method of forming and using templates for tools to use comprising:
forming a smooth faced flexible track around a work piece by use of pins
slideable in a pin sleeve to form a predetermined shape,
locking the track in position using a locking mechanism on the pin sleeve such
that the track remains fixed while maintaining the predetermined shape,
attaching a work tool, having an adjustable length arm mechanism and a motion system,
to the work piece, such that the tool can work on the work piece by allowing the
adjustable arm mechanism to follow the track while the motion system allows the work
tool to orbit the work piece and maintain its relative orientation and distance to the
surface of the work piece.

21. A method of forming and using templates for tools as in claim 20 further
comprising:
an orbital motion system employing magnetic wheels to orbit the workpiece.

22. A method of forming and using templates for tools as in claim 20 further
comprising:
an orbital motion system employing a chain and wheels to orbit the workpiece.

23. A method of forming and using templates for tools as in claim 20 further
comprising:
an orbital motion system employing a circular band to orbit the workpiece.

24. A method of working on a workpiece comprising the steps of,
providing an adjustable template attached to the workpiece,
orbiting the axis of the workpiece with a tool carriage,
axially extending and retracting a tool arm having a tool thereon, relative to the
tool carriage,
controlling the axial position of the tool by the template guiding the axial position
of the tool arm relative to the tool carriage.

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1 25. A tool for orbitally working on a workpiece comprising:

2 a means for attaching an orbital tool carriage to a workpiece such that the orbital
3 tool carriage axially orbits the workpiece,

4 a tool for operating on the workpiece,

5 a means for axially moving the tool relative to the orbital tool carriage,

6 a means for attaching an adjustable template to the workpiece,

7 a tracer arm for engaging and following the template on the workpiece connected
8 to the means for axially moving the tool relative to the orbital tool carriage, such that the
9 tool operates on the workpiece at the desired axial position as the tool orbits the
10 workpiece.

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1 26. A tool for orbitally working on a workpiece as in claim 25 wherein:

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3 the tool is attached to an axially extending tool arm which moves axially on the
4 orbital tool carriage.

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1 27. A tool for orbitally working on a workpiece as in claim 25 wherein:

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3 the tool is attached to an axially tool carriage which is moveably attached to an
4 axially extending tool arm extending from the orbital tool carriage.

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1 28. A tool for orbitally working on a workpiece as in claim 25 wherein:

2 a flexible template on the workpiece having its free ends seamlessly connected
3 and is attached to the workpiece.

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29. A method of forming and using templates for tools to use comprising:
forming a smooth faced flexible track around a work piece of a predetermined
shape,
locking the track in position using a locking mechanism on the pin sleeve such
that the track remains fixed while maintaining the predetermined shape,
attaching a work tool, having an adjustable length arm mechanism and a motion system,
to the work piece, such that the tool can work on the work piece by allowing the
adjustable arm mechanism to follow the track while the motion system allows the work
tool to orbit the work piece and maintain its relative orientation and distance to the
surface of the work piece.

30. A method of forming and using templates for tools as in claim 20 further
comprising:
an orbital motion system employing magnetic wheels to orbit the workpiece.

31. A method of forming and using templates for tools as in claim 20 further
comprising:
an orbital motion system employing a chain and wheels to orbit the workpiece.

32. A method of forming and using templates for tools as in claim 20 further
comprising:
an orbital motion system employing a circular band to orbit the workpiece.